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Abstract

RUST-RESISTING PROPERTY OF ZIRCONIUM AND ITS ALLOYS IN WATER AND STEAM AT HIGH TEMPERATURES

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It is established in this work that the rust-resisting property of zirconium and its alloys is also structural-and-sensitive property. The rust-resisting property greatly depends on distribution and redistribution of ingredients along the boundaries of metal grains and the resulting oxide films. The contact autoradiography and metallography methods reveal that the ingredients of carbon, hydrogen, nitrogen and of some alloying admixtures (tin, iron, nickel and niobium) effect the rust-resisting property of zirconium in water and steam medium of high parameters. Two methods of investigation had been used. In the first case the radiactive isotopes were added to zirconium in the process of founding of alloys. The samples were subjected to heat treatment and then to the rust-resistance test. In this case redistribution of ingredients and alloying elements in the process of corrosion in inactive water and steam of high parameters had been analyzed. In the second case inactive alloys of zirconium in steam and water medium containing tritium had been analyzed. The samples were activated in the process of corrosion as a result of interaction of tritium contained in the water with zirconium.

Electronic microscopic studies were also made of the surface of zirconium and its alloy specimens attacked by corrosion and also of the structures of their cross-sections subjected to cathode pickling.

The results of these investgations are cited in the paper.

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